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EXAMINER	
UHLIR, NIKOLAS J	

ART UNIT	PAPER NUMBER
1773	

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10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/816,548	OHMORI, HIROYUKI	
	Examiner	Art Unit	
	Nikolas J. Uhlir	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-18* is/are pending in the application.

4a) Of the above claim(s) *17 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. This office action is in response to the amendment/request for reconsideration dated 9/30/03 (paper #9). Currently, claims 1, 3-18 are pending, and claims 17-18 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 3-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the instant case, claim 1 has been amended to require a non-magnetic metal ground layer which is "constructed by sequentially stacking a plurality of layers, wherein each stacked layers has an RU concentration of at least 20 at%, and includes compositions containing Ru and an element other than Ru." These limitations are not supported by the specification or claims as filed, and thus constitute new matter.

4. Careful consideration of the specification reveals that page 12, line 20 through page 13, line 3 of the instant specification provides support for a multilayer ground layer made by "layering a plurality of layers having different compositions of Ru and an element other than Ru." Further, the instant specification, page 10, lines 14-17 of the

instant specification state that if an Ru alloy is utilized as the non-magnetic metal ground layer, the non magnetic metal ground layer should contain >20 atomic % Ru. However, it is important to note that the teaching on page 10 of the specification is in reference to element #2 of figure 1, which details a *single* layer ground layer. Thus, while there is support for a single ground layer containing >20at% Ru, and a ground layer comprising multiple layers wherein each layer contains "different" amounts of Ru, there is nothing in the specification which supports that when the ground layer is made up of a plurality of layers, that "each of the stacked layers has an Ru concentration of at least 20at.%." Thus, this limitation is new matter.

5. Further, the language "layering a plurality of layers having different compositions of Ru and an element other than Ru." On page 12, lines 20+ does not provide support for "sequentially" layering (i.e. forming layers directly adjacent one another), as "layering a plurality of layers" does not require that the layers be "sequentially stacked." Rather, "layering a plurality of layers" is open to other layers being present between each of the individual ground layers making up the "plurality" of ground layers. Further, there is no example or diagram that provides support for a multiple layer ground layer wherein each layer of the plurality of ground layers is formed directly adjacent to (i.e. sequentially from) another ground layer. Thus, this limitation is new matter.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. In the instant case, despite the applicant's amendment, it remains unclear to the examiner what exactly is claimed by claim 16. Claim 16 requires a separation layer which requires either Ru singly or an Ru alloy, and at least one kind of material selected from a first group of metallic elements and a second group of oxides, nitrides, and carbides. How can the separation layer be "Ru singly," if the claim requires the separation layer to contains at least one kind of materials selected from the first group and the second group? Further, it is unclear to the examiner whether the applicant requires the separation layer to contain at least one material selected from **both** the first group **and** the second group, or at least one material selected from **either** the first group **or** the second group. Clarification is required.

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1, 4-5, 12, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. (US6183893) in view of Futamoto et al. (US6383667).

10. For the purpose of clarity, the Futamoto references will be denoted as Futamoto '893 and Futamoto '667 respectively.

11. Claim 1 requires a perpendicular magnetic recording medium comprising: a non-magnetic substrate; a non-magnetic metal ground layer formed on a main surface side of the non-magnetic substrate and containing ≥20 at. % Ru; and a magnetic layer formed on the non-magnetic metal ground layer and having a metal magnetic thin film,

wherein the non-magnetic metal ground layer is constructed by sequentially stacking a plurality of layers, wherein each stacked layer has a Ru concentration of ≥20at%, and includes compositions containing Ru and an element other than Ru.

12. For the purpose of clarity, the examiner interprets the phrase "includes compositions containing Ru and an element other than Ru" as open language which means that at least one of the sequentially stacked layers is an alloy containing ≥20at% Ru and another element, but not that "each" of the plurality of layers must be a Ru alloy. Further, the term, the examiner interprets the term "plurality" to mean "two or more."

13. Regarding these limitations, Futamoto '893 teaches a perpendicular magnetic recording medium comprising a substrate, a first underlayer directly on the substrate, a second underlayer directly on the first magnetic layer, and a perpendicular magnetic layer directly on the second underlayer (column 5, lines 45-60). The first underlayer is suitable made from Ru, Ti, or alloys of these elements with Cr, V, Mo, or W (column 9, lines 15-25).

14. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Ru or an alloy of Ru with Cr, V, Mo or W as the first underlayer taught by Futamoto '893, as Futamoto '893 recognizes the equivalents of these materials to the others listed as suitable for this purpose.

15. Further, Futamoto '893 teaches that the second underlayer has a saturation magnetization <50emu/cc, and is chosen so as to have a lattice constant within 5% of the magnetic layer (column 9, lines 40-45). Suitable materials for this purpose include Co alloys containing up to 50 atomic % of an additive element (column 9, lines 30-38).

In at least one specific embodiment, Futamoto '893 teaches the use of a weakly magnetic CoRu alloy containing 35 atomic % Ru as the second underlayer (column 13, lines 25-27).

16. Futamoto '893 fails to teach the use of multiple non-magnetic metal ground layer films, wherein each film contains ≥20 at% Ru, as required by claim 1.

17. However, with respect to this deficiency, Futamoto '667 teaches many different CoRu alloys which are suitable for use as second underlayers between a first underlayer and a magnetic layer. Similar to Futamoto '893, the second underlayer is chosen so as to have a lattice constant within 5% that of the magnetic layer (column 14, lines 51-54). This second underlayer is weakly magnetic or non-magnetic, with CoRu alloys containing >34 at% Ru being nonmagnetic (column 13, lines 55-65). Suitable CoRu alloys include those containing from 35-75 atomic % Ru (column 18, table 4).

18. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a non-magnet CoRu alloy containing >35 atomic % Ru as taught by Futamoto '667 as the second underlayer utilized in Futamoto '893.

19. One would have been motivated to make this modification given that the non-magnetic CoRu alloys containing >35 atomic % Ru taught by Futamoto '667 meets all of the requirements of the 2nd underlayer of Futamoto '893, as these alloys are taught to be suitable for use as a second underlayer between a perpendicular magnetic layer and a first underlayer, and are capable of having a lattice parameter within 5 at% of a perpendicular magnetic layer deposited in contact with the second underlayer. Further, the CoRu alloys containing >35 at% Ru taught by Futamoto '667 are non-magnetic, and

thus meet Futamoto '893's requirement that the second underlayer should have a saturation magnetization <50emu/cc.

20. The examiner recognizes that the 1st underlayers of Futamoto '667 and Futamoto '893 have different crystal structures, in that the 1st underlayer of Futamoto '667 has a B2 crystal structure, whereas the 1st underlayer of Futamoto '893 has an hcp crystal structure. However, the purpose of the second underlayer in both of these references is identical, namely to lattice match with the perpendicular magnetic layer. Thus, one of ordinary skill in the art would be motivated to form the 2nd underlayer of Futamoto '893 with the materials utilized in Futamoto '667 with a reasonable expectation of success.

21. Thus, the limitations of claim 1 are met, as the combination of Futamoto '893 with Futamoto '667 results in the formation of a recording medium having a 1st underlayer of Ru on the substrate and a second underlayer of CoRu containing >35 at% Ru directly on the 1st underlayer and below the magnetic layer.

22. The limitations of claim 4 require the non-magnetic metal ground layer to be made of an alloy of Ru and at least one material selected from Cr, Ti, Ta, Zr, Hf, Fe, Co, Mn, Si, Al, Ag, Au, and Ir, wherein the composite ratio of the Ru concentration in the alloy is ≥50 at%. As set forth above for claim 1, Futamoto '667 teaches that CoRu alloys containing from 35-75 at% Ru are suitable for use as second underlayers in a recording medium having similar structure to that of Futamoto '893. CoRu alloys containing 35 atomic % Ru and ≥50at% Ru are specifically taught in Table 4 of Futamoto '667.

23. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a CoRu alloy containing ≥50 at% Ru as taught by Futamoto '667 as the second underlayer in the recording medium taught by Futamoto '893, as Futamoto '667 recognizes the equivalency of CoRu alloys containing >50 atomic % Ru to a CoRu alloy containing 35 atomic % Ru.

24. Futamoto '893 as modified by Futamoto '667 does not explcitly teach a magnetic recording medium utilizing a non-magnetic metal ground layer made of an alloy of Ru and at least one kind of material selected from W, Mo, V, Nb, and B, wherein the composite ratio of Ru in the alloy is 20 at % or more, as required by claim 5.

25. The examiner interprets the limitations of claim 5 to require that only one of the layers is the multilayer non-magnetic metal ground layer is required to have this composition. Bearing this interpretation in mind, it is noted that Futamoto '667 teaches suitable materials for the second underlayer include alloys of CoRu alloys and CoRuCr alloy, such as $CoRu_{35}$ and $CoRu_{20\text{-}30}Cr$ alloys (Futamoto '667, column 16, lines 30-41). Further, Futamoto '893 teaches that that the second underlayer can comprise an alloy of Co with one or more elements selected from Cr, W, Nb, V-Mo, Ti, Re, or Y (Futamoto '893, column 9, lines 25-35).

26. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize a CoRuCr alloy containing 20-30 atomic % Ru as taught by Futamoto '667 as the 2nd underlayer in Futamoto '893, as Futamoto '667 recognizes the equivalency of a $CoRu_{35}$ alloy and $CoRu_{20\text{-}30}Cr$ alloys as suitable alloys for use as 2nd underlayers between a first underlayer and a magnetic layer.

27. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute W, V or Nb for the Cr in the $CoRu_xCr_y$ 2nd underlayer utilized by Futamoto '893 as modified by Futamoto '667, as Futamoto '893 recognizes the equivalency of W, V, and Nb to Cr as suitable elements for use in Co alloy 2nd underlayers.

28. Claim 12 requires the magnetic layer to comprise 0.5-25 at% of one of the elements listed. Futamoto '893 teaches an embodiment wherein $CoCr_{17}Ta_5$ is utilized in the magnetic layer (column 11, lines 55+). Thus, the limitations of claim 12 are met.

29. Claim 15 requires the medium of claim 1 to comprise a plurality of magnetic layers separated by at least one separation layer, wherein the separation layer is Ru singly or an ally of Ru with one of the elements listed. In a specific embodiment, Futamoto '893 teaches a recording medium comprising a lower magnetic layer 24, and upper magnetic layer 26, and an intermediate layer 25 between the upper and lower magnetic layers. This intermediate layer is made of a $CoRu_{45}$ alloy (column 13, lines 10-39). Thus, the limitations of claim 15 are met.

30. Regarding claim 16, the examiner interprets this claim to require the intermediate layer to comprise Ru, or an Ru alloy, such that the Ru or Ru allot contains at least one of the components listed in group 1 or group 2. Bearing this interpretation in mind, it is noted that Futamoto '893 teaches the use of a $CoRu_{45}$ alloy intermediate layer (column 13, lines 25-27). Further, Futamoto '667 teaches that suitable materials for forming intermediate layers between two magnetic layers include weakly magnetic or nonmagnetic $CoCrM_x$ alloys, where M is an additive element and x is the atomic % of

that additive element (column 12, lines 5-15). Futamoto '667 teaches that a non-magnetic $CoRu_xCr$ alloy is formed when x is >34 atomic % (column 13, lines 54-65). Thus, as this alloy meets Futamoto's earlier requirement that the intermediate layer must be weakly magnetic or non-magnetic and formed of $CoCrM_x$ (M in this case is Ru) alloy, it is reasonable to infer that this alloy is suitable for use as the intermediate layer.

31. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a CoRuCr alloy containing >34 atomic % Ru as taught by Futamoto '667 as the intermediate layer taught by Futamoto '893, as these materials are recognized as equivalent for use as an intermediate layer between two magnetic layers.

32. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto '893 as modified by Futamoto '667 as set forth above for claim 1, further in view of Lal et al. (US5356522).

33. Futamoto '893 as modified by Futamoto '667 fails to teach a magnetic recording medium having non-magnetic metal ground layer comprising a plurality of layers containing at least 20 atomic %Ru, wherein the ground layer has a graded composition such that the composition of the non-magnetic metal ground layer continuously changes, as required by claim 3.

34. However, with respect to this deficiency, Lal et al. (Lal) teaches a magnetic recording medium that utilizes an underlayer having an axial composition gradient. The portion of the underlayer adjacent to the substrate is made of one composition, the portion of the underlayer adjacent the magnetic layer is made of a different composition,

and the composition of the underlayer gradually changes from the substrate side to the magnetic layer side (column 5, lines 40-58). Due to the continuous gradient between the substrate side composition and the magnetic layer side composition, the underlayer avoids interface discontinuities (column 9, lines 40-45).

35. Therefore it would have been obvious to one of ordinary skill in the art to utilizes the method taught by Lal et al. to form an axial composition gradient between the first and second underlayers taught by Futamoto '893 as modified by Futamoto '667.

36. One would have been motivated to make this modification in light of the teaching in Lal that interface discontinuities in then underlayer can be avoided by forming an axial composition gradient within the underlayer.

37. The examiner acknowledges that Lal is directed towards an underlayer having an axial composition gradient between a substrate side composed of Ti and a magnetic layer side composed of Cr. However, there is no teaching in Lal that the advantage of the axial composition gradient, namely the avoidance of interface discontinuities, would be unattainable if other substrate side and magnetic layer side compositions were utilized. Further, one of ordinary skill in the art would expect interface discontinuities to occur between the lower underlayer (i.e. Ru) and upper underlayer (i.e. CoRu) utilized in Futamoto '893 as modified by Futamoto '667, as a CoRu alloy layer would be expected to have a smaller lattice parameter than a pure Ru, as Co has a smaller atomic radius than Ru. Thus, one of ordinary skill in the art would have been motivated to modify Futamoto '893 as modified by Futamoto '667 with the teachings of Lal with a reasonable expectation of success.

38. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto '893 as modified by Futamoto '667 as applied to claim 1 above, and further in view of Shiroishi et al. (US4833020).

39. Futamoto '893 as modified by Futamoto '667 does not teach a non-magnetic metal ground layer made of an alloy of Ru and at least one of Cu, Ni, Pd, Pt, Y, and C, wherein the amount of Ru in the alloy is ≥80 at. %, as required by claim 6.

40. However, Shiroishi et al. teaches a magnetic recording medium that comprises a substrate, a first underlayer, a second underlayer, and a magnetic layer, wherein the second underlayer comprises an element selected from Cr, Mo, W, Ru, Os, Pd, V, Nb, Hf, Rh, Pt, or Ir and up to 20% of an element selected from Zr, Si, Ti, Y, Sc, Al, C, Ge, Sb, And Cu. Shiroishi et al. teaches that magnetic media with improved signal to noise ratio are formed when a second underlayer of this type is utilized (column 2, line 13-column 3, line 2).

41. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to substitute an Ru underlayer containing up to 20 atomic % of Cu or C as taught by Shiroishi et al. for the CoRu underlayer taught by Futamoto '893 as modified by Futamoto '667.

42. One would have been motivated to make this modification due to the teaching in Shiroishi et al. that magnetic media exhibiting improved signal to noise ratio are formed when a second underlayer comprising an alloy of Ru with up to 20 atomic % of C or Cu is utilized. Regarding the specific selection of Ru, Cu and C, Ru is taught to be equivalent to the other elements listed as suitable for the main component of the second

underlayer, and Cu or C are taught to be equivalent to the other elements listed as suitable for the secondary components of the second underlayer.

43. Claims 7-8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto '893 as modified by Futamoto '667 as applied to claim 1 above, and further in view of Suzuki et al. (US6335103)

44. Futamoto '893 as modified by Futamoto '667 does not teach a non-magnetic metal ground layer that contains oxygen and or nitrogen, as required by claim 7, specifically 0.2-10 at. % O or N, as required by claim 8. The examiner interprets the requirements of claims 7-8 to require only one of the non-magnetic metal ground layers to contain the recited amount of O or N.

45. However, Suzuki et al. teaches that adding 0.1-10 at. % of oxygen to a non-magnetic underlayer of a magnetic recording medium reduces the grain size of the underlayer, which in turn reduces the noise of a magnetic layer deposited on the underlayer (column 11, lines 38-46)

46. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to add 0.1-10 at. % oxygen as taught by Suzuki et al. to the CoRu underlayer taught by Futamoto '893 as modified by Futamoto '667.

47. One would have been motivated to make this modification due to the teaching in Suzuki et al. that adding 0.1-10 at. % oxygen to an underlayer of a magnetic recording medium reduces the grain size of the underlayer, thus reducing the noise of a magnetic layer disposed on the underlayer.

48. Futamoto '893 as modified by Futamoto '667 does not teach a magnetic layer that contains 0.2-15 at. % oxygen or nitrogen, as required by claim 13.

49. However, Suzuki et al teaches that adding 0.1-15 at. % oxygen to a magnetic layer of a magnetic recording layer reduces the grain size of the magnetic layer, thereby reducing the noise of the recording medium (column 3, line 67-column 4, line 5).

50. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to add 0.1-15 at% oxygen as taught by Suzuki et al to the magnetic layer of Futamoto '893 as modified by Futamoto '667.

51. One would have been motivated to make this modification due to the teaching in Suzuki et al. that adding oxygen to the magnetic layer of a recording medium improves the noise of the medium.

52. Regarding the combination of Futamoto '893 as modified by Futamoto '667 with Suzuki. The examiner acknowledges that the end product of Futamoto '893 as modified by Futamoto '667 (a perpendicular recording medium) and the end product of Suzuki (a longitudinal medium) are fundamentally different. However, the examiner is merely relying on the teaching in Suzuki that the addition of oxygen to a magnetic layer is known to reduce the grain size of the magnetic layer. One of ordinary skill in the art would expect this reduction in grain size irrespective of the magnetic orientation of the layer. Thus, one of ordinary skill in the art would have been motivated with a reasonable expectation of success to add oxygen to the magnetic layer utilized by Futamoto '893 as modified by Futamoto '667 per the teaching in Suzuki.

53. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto '893 as modified by Futamoto '667 as applied to claim 5 above, and further in view of Wu et al. (US6218003).

54. Futamoto '893 as modified by Futamoto '667 does not teach a non-magnetic metal ground layer that contains at least one material selected from oxides, nitrides, carbides, and carbon, as required by claim 9, specifically one of the oxides, nitrides, or carbides listed by claim 10.

55. However, Wu et al. teaches that the recording density, coercivity, signal to noise ratio, and signal pulse characteristics of a magnetic recording medium can be improved by adding TiO_2 to a Cr alloy underlayer utilized in the media (column 3, lines 1-7).

56. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to add TiO_2 as taught by Wu et al. to the $CoRu_xCr_y$ alloy underlayer utilized by Futamoto '893 as modified by Futamoto '667

57. One would been motivated to make such a modification due to the teaching in Wu et al that the magnetic properties of a magnetic recording medium can be improved by adding TiO_2 to a Cr alloy underlayer utilized in the formation of the media, and the fact that the $CoRu_xCr_y$ underlayer utilized by Futamoto '893 as modified by Futamoto '667 is a Cr alloy underlayer.

58. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto '893 as modified by Futamoto '667 as applied to claim 15 above, further in view of Honda et al. (US5851643).

59. Futamoto '893 as modified by Futamoto '667 does not teach a magnetic recording medium wherein the magnetic layer is constructed by a plurality of metal magnetic thin films, with at least one intermediate layer inserted there between, wherein the intermediate layer is made of at least one kind of material selected from Pt, Pd, and Ni, as required by claim 11.

60. However, Honda et al. teaches that a magnetic recording medium that exhibits reduced read back noise can be formed by utilizing a magnetic film that is formed by laminating two magnetic layers together with an intervening non-magnetic layer (column 9, lines 55-64). Suitable materials for forming the intermediate layer include Ru, Pt, or Pd (column 17, lines 54-61).

61. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize Ru, Pt or Pd as taught by Honda as the intermediate layer in the multilayer magnetic film utilized by Futamoto '893 as modified by Futamoto '667, as Honda teaches the equivalence to Ru based intermediate layers to Pt and Pd based intermediate layers.

Examiner's Note

62. All of the above cited references except for Futamoto '893 accompanied a previous office action and so have not been included with this office action.

Response to Arguments

63. Applicant's arguments filed 9/30/03 have been fully considered but they are not persuasive. In the instant case, the applicant's argument's focus on the fact that the previously cited prior art does not teach all of the requirements of claim 1. More

specifically, the previously cited prior art does not teach a non-magnetic metal ground layer comprising a plurality of layers wherein each layer contains ≥20 atomic % Ru and includes compositions other compositions containing Ru and an element other than Ru.

64. This argument is unpersuasive for two reasons. First, the newly cited prior art teaches the use of multiple adjacent underlayers, wherein the first underlayer comprises Ru and the second underlayer comprises an Ru alloy. Second, the amendment to the instant claims to require the non-magnetic metal ground layer to comprise sequentially stacking a plurality of layers, wherein each stacked layer has an Ru concentration ≥20at% introduces new matter.

65. All of the applicants other arguments turn on the argument addressed above. Thus, as the above argument has been effectively rendered moot, the applicants further arguments are unpersuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhlir whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

NJU
10/17/03

Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700